



# Science Operations Center

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**Bryan Dorland**  
**MO&DA System Engineer**  
**USNO**  
**202-762-0134**  
**[bdorland@usno.navy.mil](mailto:bdorland@usno.navy.mil)**



# Presentation Outline



- **SOC Mission Level Requirements**
- **SOC PDR Documentation**
- **SOC Interfaces**
- **Concept of Operations**
- **Priority of Requirements**
- **SOC Operations and Staffing**
- **Risks and Risk Mitigation**
- **Prototypes**



# SOC Mission-Level Requirements



**From the Mission Requirements Document, the SOC Shall:**

- **Produce the FAME Science Deliverables**
  - **Input, Output Catalogs, Reports, Observation Database**
  - **Data Reduction Pipeline**
- **Assess the State of Health of FAME Instrument**
  - **Detect Anomalous Conditions**
  - **Initiate Anomaly Recovery or Mitigation Procedures**
- **Provide Instrument Tasking Schedules**
- **Maintain the Onboard Input Catalog**
- **Archive**
  - **All Data Products Received From MOC**
  - **All Critical Data Reduction Intermediate Products**
- **Provide a Data Simulator**
- **Provide Backup Housekeeping Telemetry Monitoring Capability for MOC**



# SOC PDR Documentation



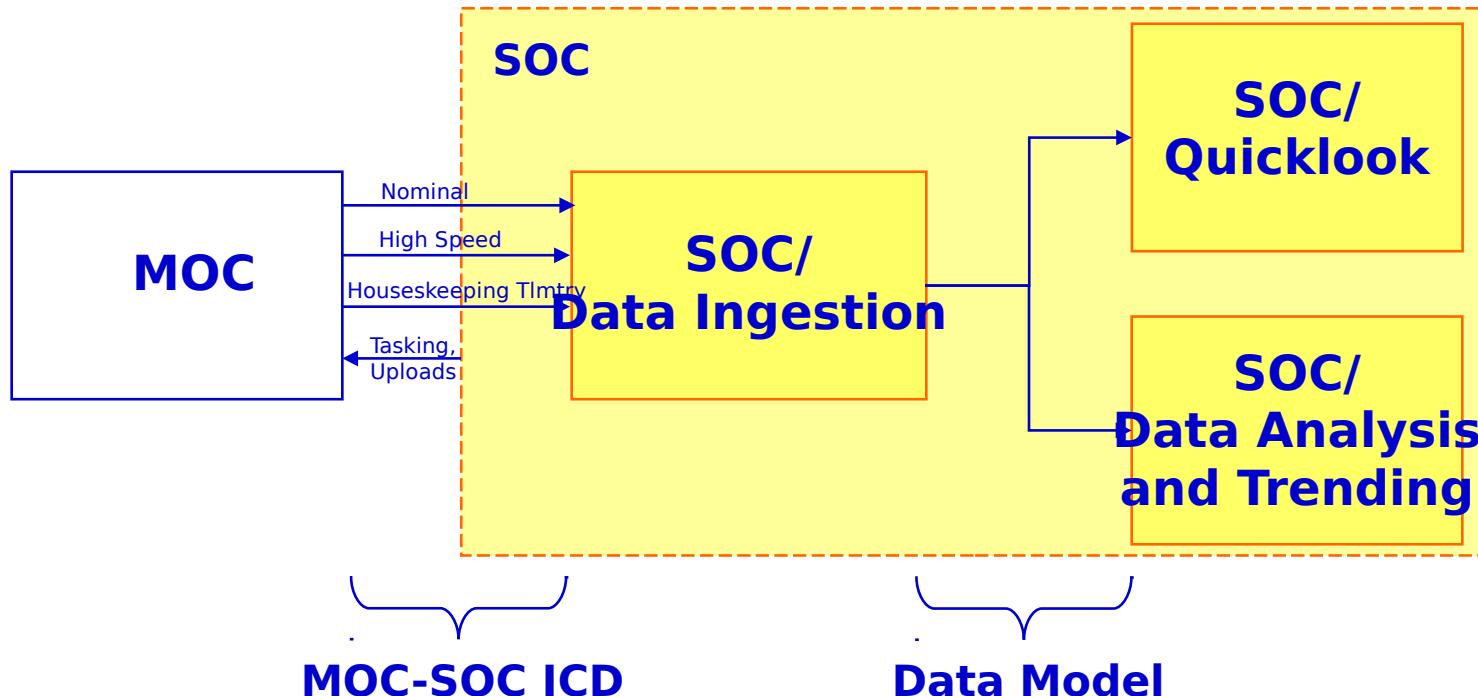
Document	Version	Lead Author	Description
Requirements Allocation Matrix	1.0	Dorland	Allocation of Requirements to MO&DA Systems/subsystems. Contained As Appendix in Req. Doc.
SOC Concept of Operations	1.0	Dorland	Overall Description of SOC System
SOC Requirements	1.0	Dorland	SOC System Requirements
Data Analysis Plan	2.0	Kaplan	Description of Data Analysis Processing Concepts and Algorithms
SOC Design Document	1.0	Codella	SOC ADP System Design Document
SOC Software Development Plan	1.0	Codella	Implementation of SMP. Detailed Description of FAME Software Design and Development Policies, Including Schedules, QA, CM, Etc
MOC-SOC LCD	0.2	Dorland	Specification of Interface Between MOC and SOC



# SOC Interfaces



- **External Interface**
  - **SOC-MOC**
- **Internal Interface**
  - **Data Ingestion-Data Analysis and Trending**





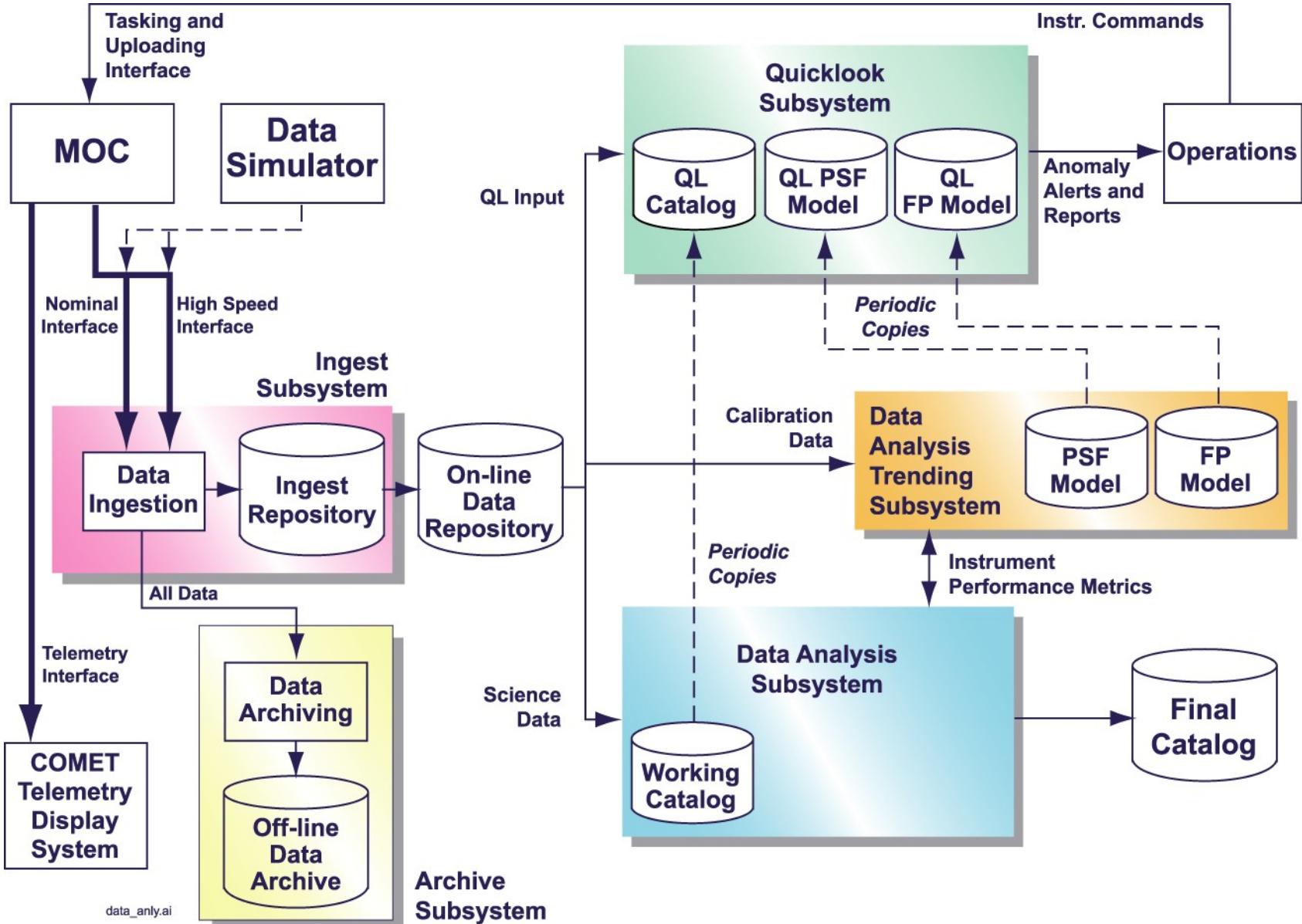
# MOC-SOC Interface Types



Name	Direction	Purpose	Data Rate	Format	MOC Time Delay
<b>Nominal Data Transfer</b>	<b>MOC-&gt;SOC</b>	<b>Normal Science Operations Data Transfer Mode</b>	<b>As Available</b>	<b>MOC "Recording File" Transfer Via FTP</b>	<b>&lt;15 Minutes</b>
<b>High Speed Data Transfer</b>	<b>MOC-&gt;SOC</b>	<b>Minimum Time Delay Data Transfer Mode</b>	<b>As Available</b>	<b>TBD</b>	<b>&lt;30 Seconds</b>
<b>Telemetry Transfer</b>	<b>MOC-&gt;SOC</b>	<b>SOC Real Time Display of Ground Station and Housekeeping Telemetry</b>	<b>80 Kbps (TBR)</b>	<b>Streaming Via TCP Socket</b>	<b>Real Time</b>
<b>Tasking and Uploading</b>	<b>SOC-&gt;MOC</b>	<b>Instrument Tasking and On-Board Catalog Updating</b>	<b>As Needed</b>	<b>TBD</b>	<b>NA</b>

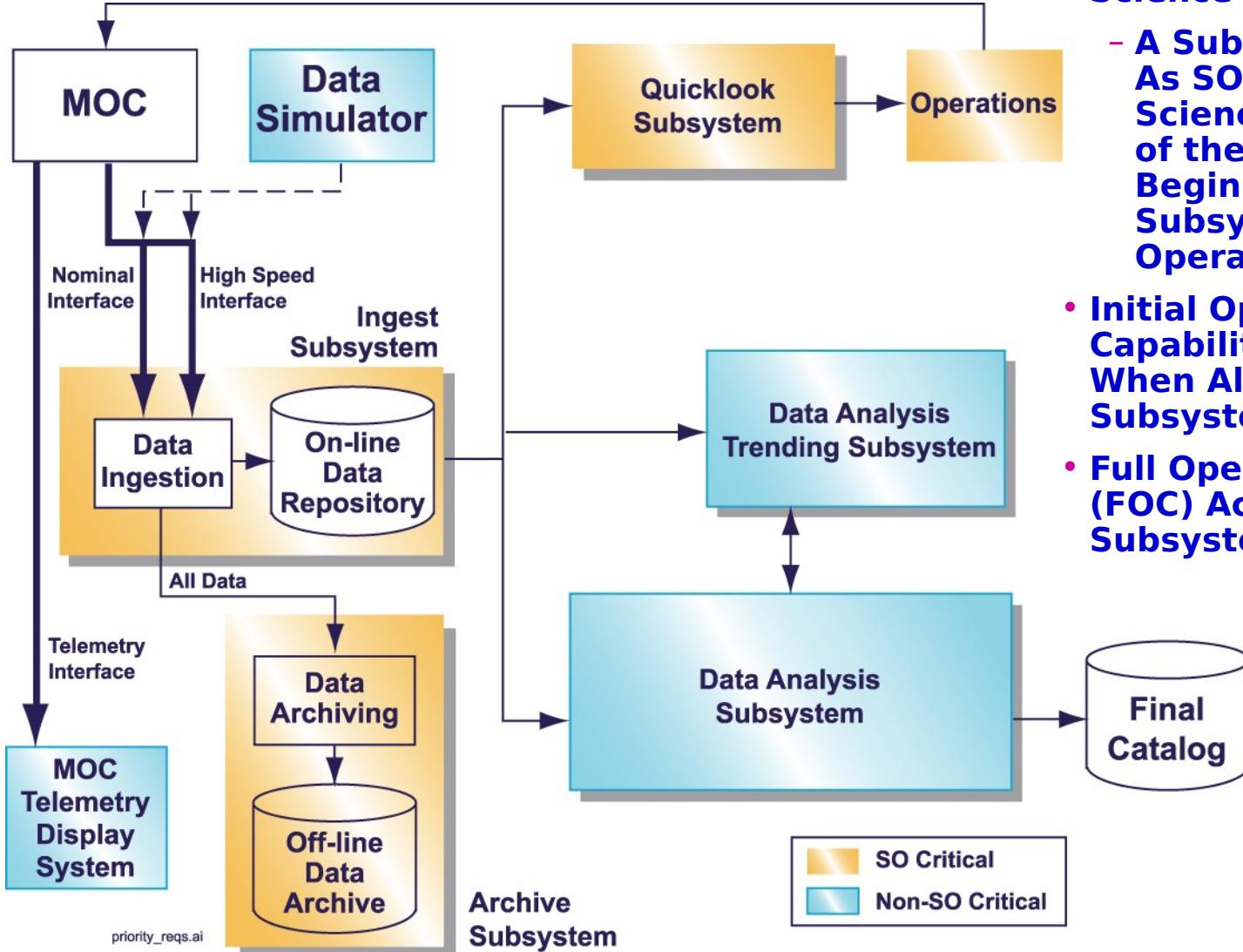


# Concept of Operations





# Priority of Requirements



- **Science Operations Critical**
  - A Subsystem Is Defined As SO Critical When the Science Operations Phase of the Mission Cannot Begin Without the Subsystem Being Operational
- **Initial Operational Capability (IOC) Achieved When All SO Critical Subsystems Are Operational**
- **Full Operational Capability (FOC) Achieved When All Subsystems Are Operational**

**SOC System: Science Operations (SO) Criticality**



# SOC Operations and Staffing



- **SOC Tasks Include:**
  - Running SOC ADP System
  - Monitoring Instrument SOH
  - Taking Corrective Action When Instrument Anomalies Detected
  - Developing Tasking Schedules
  - Maintaining On-board Catalog
- **Initial Drafts of Operational Procedures Will Be Developed for CDR**
- **Current Plan**
  - Staffed 24 Hrs. Per Day, Seven Days Per Week From Three Months Before to One Year After Launch
  - Single Operator Per Shift
    - Five Operators on Staff
  - One Lead Operator
  - One SOC Manager
  - Reduce to Normal Working Hours After One Year of Operations If Feasible



# Risks and Risk Mitigation



Category	Risk	Assessed Level (Post Mitigation)	Mitigation
Single Measurement Accuracy	Inability to Meet Single Measurement Centroiding Accuracy Requirement	Medium	Algorithm Prototyping Using Data Simulator
Systematic Errors	Inability to Reduce Systematic Errors Through Processing to Meet Mission Accuracy Requirements	Medium	Algorithm Prototyping Using Data Simulator
External Interface Stability	Data Formats and Contents Still in Flux	Low	Participate in Interface Definition Process, Adhere to Development Schedule
Data Throughput and Storage	Large Volume of Data May Present Processing And/or Storage Problems	Low	Hardware and Software Prototyping
Software Development Cost	Insufficient Budget	Low	Employ Formal SW Development Methodology



# Prototypes



- **Data Analysis Algorithm Prototype**
  - Demonstrate That an End-to-end Data Analysis System Can Successfully Reduce Simulated FAME Data
  - Develop and Optimize Algorithms for Specific Processing Tasks
  - Primarily an Algorithm Prototype
- **Data Ingestion/Quicklook/Data Archive Prototype**
  - Demonstrate That a Faster-Than-Real-Time Ingestion, Quicklook and Archiving System Is Feasible by IOC
  - Primarily a Software Development Prototype
- **Data Analysis Framework Prototype**
  - Data Analysis Pipeline Architecture Testbed
  - Primarily a Software Development Prototype